

Lawrence Berkeley National Laboratory

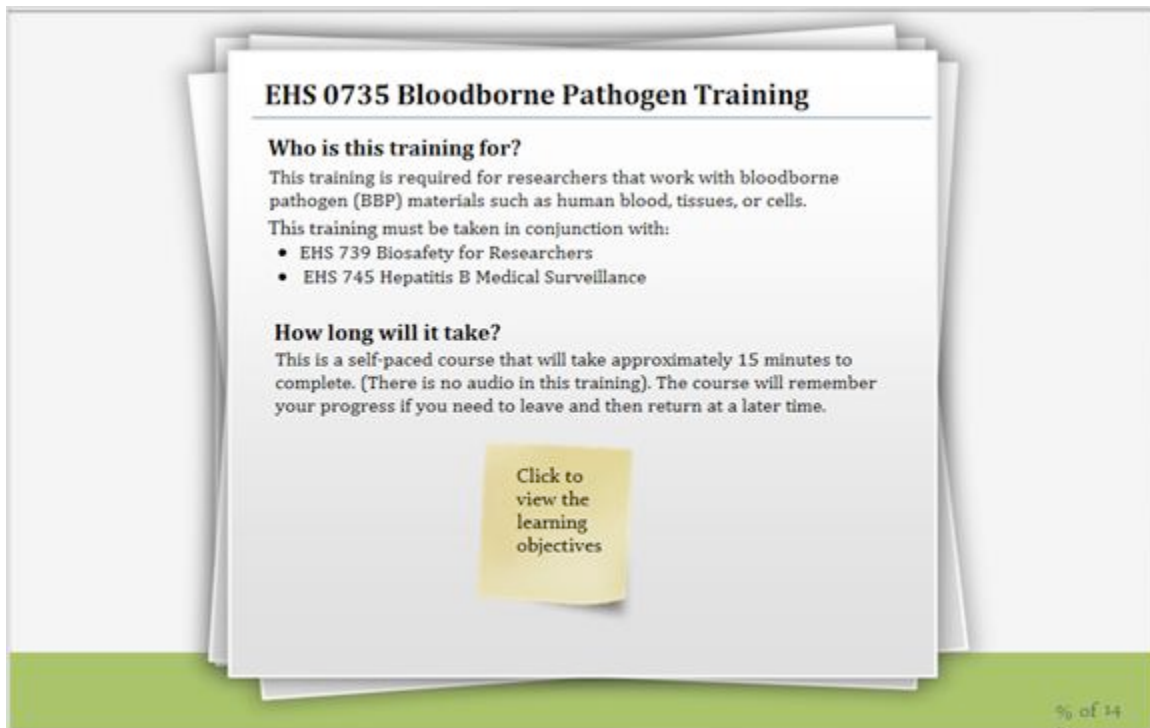
EHS 735

Bloodborne Pathogen Training for Researchers

This is the printable version of the training that can be used as a resource or for offline viewing

Last updated 1/2015

Course Requirements



EHS 0735 Bloodborne Pathogen Training

Who is this training for?

This training is required for researchers that work with bloodborne pathogen (BBP) materials such as human blood, tissues, or cells.

This training must be taken in conjunction with:

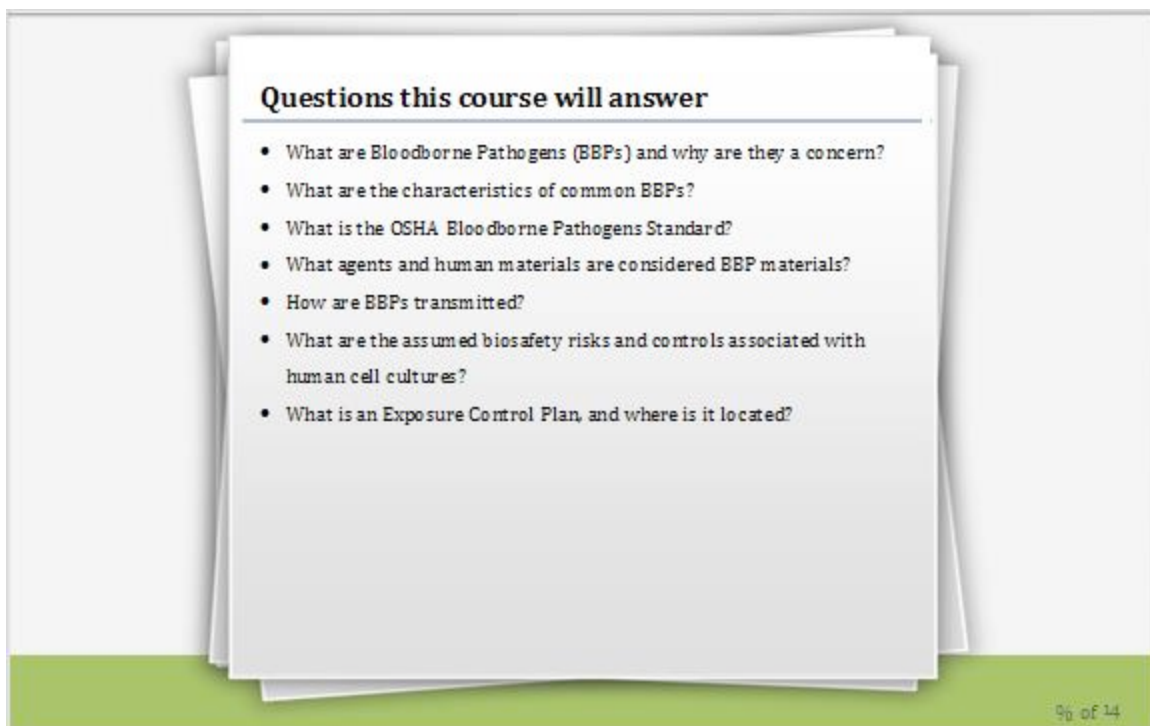
- EHS 739 Biosafety for Researchers
- EHS 745 Hepatitis B Medical Surveillance

How long will it take?

This is a self-paced course that will take approximately 15 minutes to complete. (There is no audio in this training). The course will remember your progress if you need to leave and then return at a later time.

Click to view the learning objectives

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Questions this course will answer

- What are Bloodborne Pathogens (BBPs) and why are they a concern?
- What are the characteristics of common BBPs?
- What is the OSHA Bloodborne Pathogens Standard?
- What agents and human materials are considered BBP materials?
- How are BBPs transmitted?
- What are the assumed biosafety risks and controls associated with human cell cultures?
- What is an Exposure Control Plan, and where is it located?

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What are BBPs?

What are BBPs and why are they a concern?


Bloodborne Pathogens are infectious agents that may cause human disease and are transmitted through human blood, tissues, and certain bodily fluids.

The 3 most common BBPs are:

- Human Immunodeficiency Virus (HIV)
- Hepatitis B Virus (HBV)
- Hepatitis C Virus (HCV)

Why BBP materials are a concern for researchers:

- Researchers may be exposed to unidentified BBPs that could be present in research materials such as human blood, tissues, cells, and some fluids
- Researchers might assist a co-worker who is bleeding
- Characteristics of common BBPs may add additional uncertainty and risks






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BBP Materials covered by the OSHA Standard

What are BBP Materials


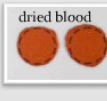
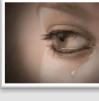
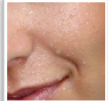
✓ YES These pathogens and human materials are covered by the OSHA BBP Standard:

- **Bloodborne pathogens** such as HIV, HBV, and HCV
- **Human blood** including blood components and products made from human blood
- **Unfixed human tissue or organ** (other than skin) from a living or dead human
- **Primary human tissue cultures or cell strains**
- **Established human cell lines**
- **Human body fluids** including semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids
- **HIV or HBV infected materials**



✗ NO Dried blood and the following human materials are NOT BBP Materials (unless they contain visible blood)

- Intact human skin
- Urine
- Feces
- Vomit
- Tears
- Sweat
- Sputum
- Nasal secretions
- Saliva

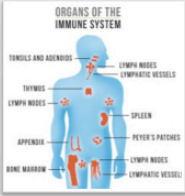
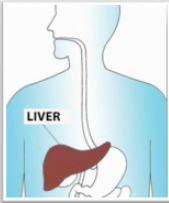


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Key Health Effects

After you read this page, click on each note to the right

AIDS	Hepatitis B	Hepatitis C
<ul style="list-style-type: none"> Compromised immune system HIV attacks the immune system so it can't fight other serious infections HIV can lead to AIDS AIDS is usually fatal No known cure 	<p>90% of adults recover within a few months, develop immunity, and never get hepatitis B again</p> <ul style="list-style-type: none"> Liver inflammation Can lead to cirrhosis and liver cancer with no known cure 	<ul style="list-style-type: none"> Leading reason for liver transplants Complications can be fatal

Symptoms

Infectivity & Viability


Carriers & Vaccine

Prevalence

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Symptoms

AIDS	Symptoms	
	Hepatitis B	Hepatitis C
<ul style="list-style-type: none"> Flu-like symptoms, fever, diarrhea, nausea, and fatigue Sore throat Headaches White coating on tongue Weight loss Swollen lymph nodes 	<ul style="list-style-type: none"> Yellowing skin and eyes (jaundice) Fever Weakness, tiredness, lasting weeks to months Dark urine Loss of appetite, nausea, vomiting Abdominal pain 	<ul style="list-style-type: none"> Jaundice (not always evident) Fatigue 80% of people have no signs or symptoms



Symptoms

Infectivity & Viability


Carriers & Vaccine

Prevalence

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Infectivity & Viability

Infectivity & Viability		
AIDS	Hepatitis B	Hepatitis C
HIV cannot reproduce and dies very quickly when outside the body (eg, 15 minutes)	<ul style="list-style-type: none"> 100 times more infectious than HIV Can survive up to 7 days in dried blood 	Can survive for several days in dried blood



Symptoms

Infectivity & Viability

Carriers & Vaccine

Prevalence

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Carriers & Vaccine

Carriers & Vaccine		
AIDS	Hepatitis B	Hepatitis C
Carriers		
<ul style="list-style-type: none"> Everyone who is infected is a carrier and is infectious Most people do not initially know they have been infected 	Some people become chronic carriers of HBV, although they may have no symptoms	Nearly all persons with acute infection will have it for life and can infect others, although they may have no symptoms
Vaccine		
No vaccine available	<ul style="list-style-type: none"> Vaccine is available Hepatitis B vaccine offered free of charge by LBNL Health Services to workers who are exposed to BBP materials 	No vaccine available

Symptoms

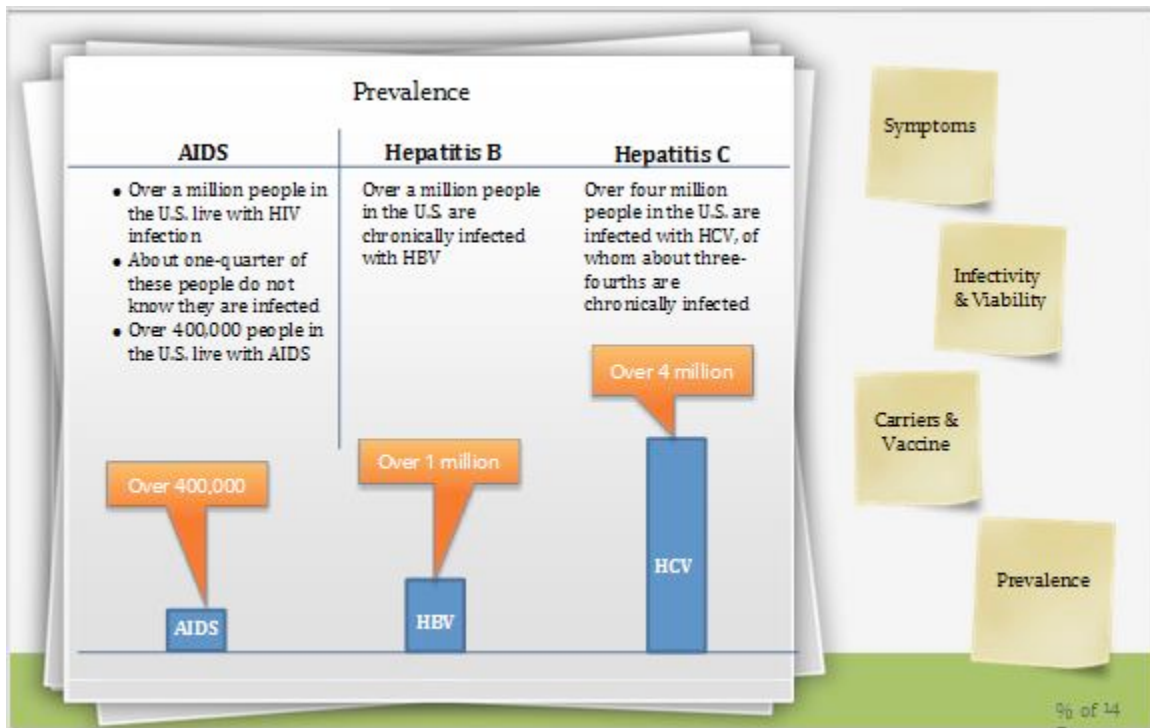
Infectivity & Viability

Carriers & Vaccine

Prevalence

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Prevalence



What Do You Think?

What do you think?

Which virus causes liver inflammation and may lead to cirrhosis and liver cancer?

Select all that apply.

☐ HIV

☒ Hepatitis B Virus

☒ Hepatitis C Virus

submit

LIVER

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Correct response: shown above

What Do You Think?



What do you think?

LBNL Health Services offers a free vaccine to those who risk exposure to which virus?

☐ HIV

☒ Hepatitis B Virus

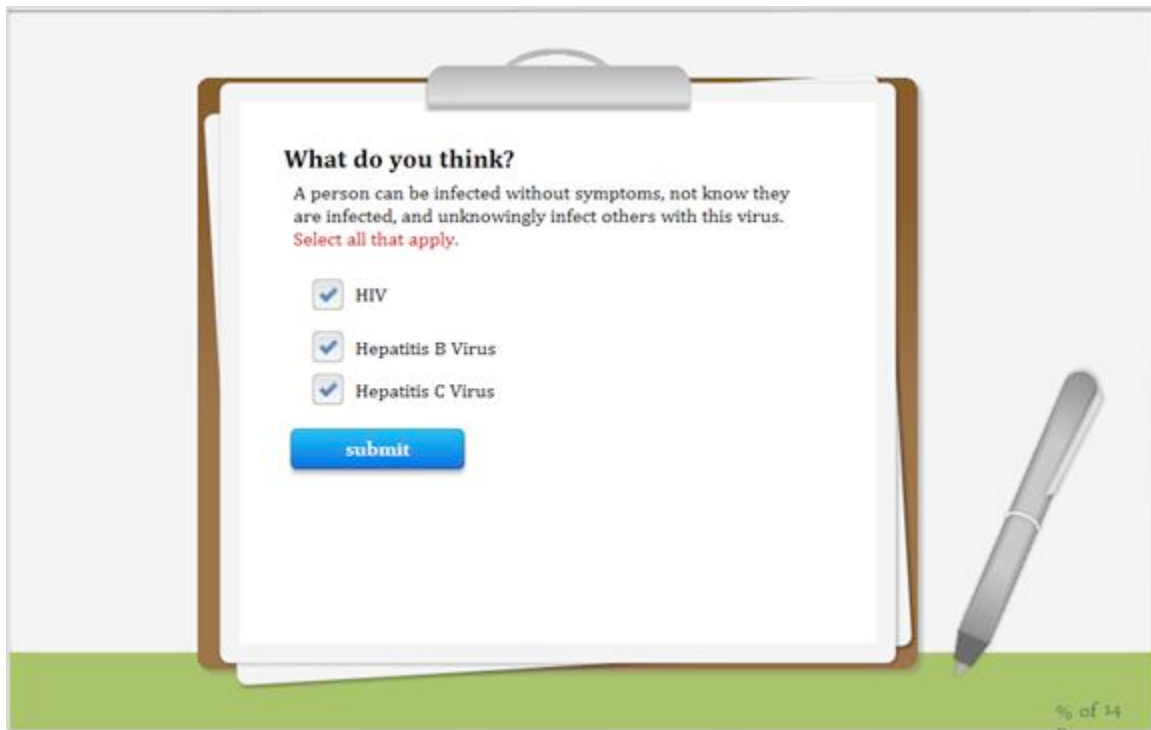
☐ Hepatitis C Virus

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Correct response: shown above

What Do You Think?



What do you think?

A person can be infected without symptoms, not know they are infected, and unknowingly infect others with this virus.

Select all that apply.

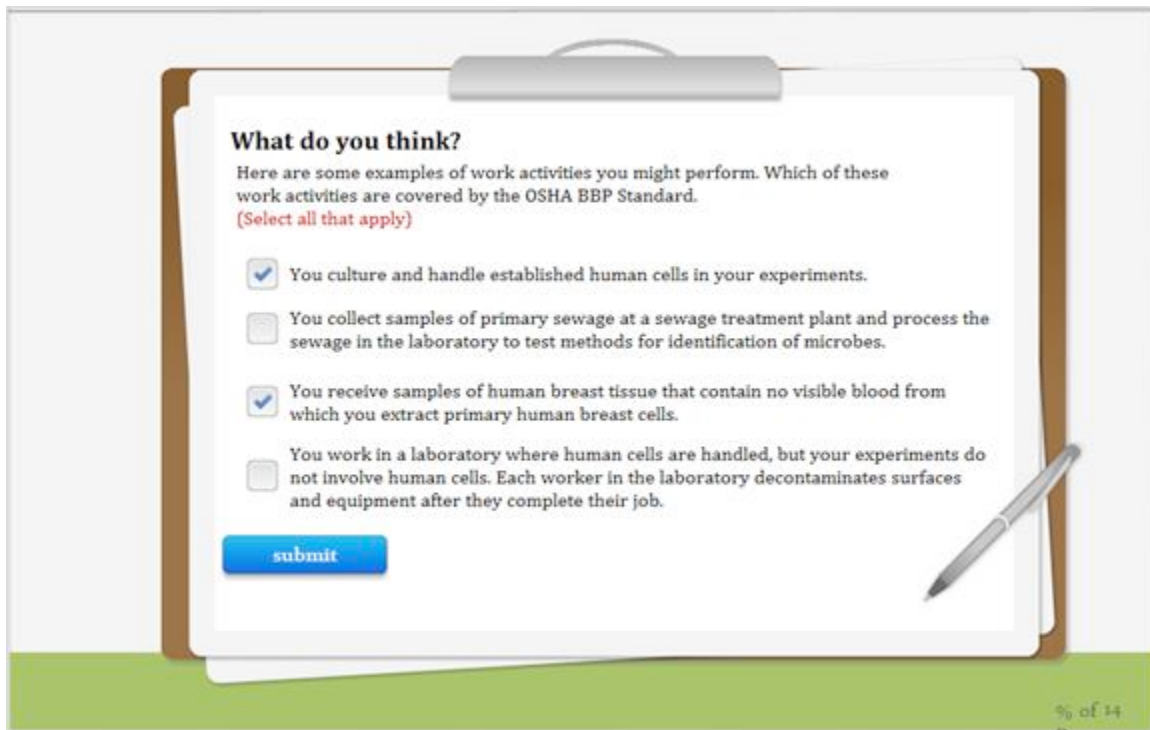
- ☒ HIV
- ☒ Hepatitis B Virus
- ☒ Hepatitis C Virus

[submit](#)

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Correct response: shown above

What Do You Think?



What do you think?

Here are some examples of work activities you might perform. Which of these work activities are covered by the OSHA BBP Standard.
(Select all that apply)

- ☒ You culture and handle established human cells in your experiments.
- ☐ You collect samples of primary sewage at a sewage treatment plant and process the sewage in the laboratory to test methods for identification of microbes.
- ☒ You receive samples of human breast tissue that contain no visible blood from which you extract primary human breast cells.
- ☐ You work in a laboratory where human cells are handled, but your experiments do not involve human cells. Each worker in the laboratory decontaminates surfaces and equipment after they complete their job.

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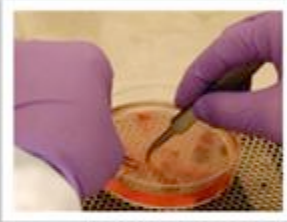
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Correct response: shown above

BBP Exposure

Potential Exposure to BBPs at work

Potential exposure to BBPs at work could occur when working with BBP materials or accidentally coming in contact with the blood of another person.



Please also click the notes to the left to learn more. ➡

Jobs with potential BBP exposure

Work-related BBP transmission examples

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Jobs with potential BBP exposure

Potential Exposure to BBPs at work

Examples of jobs with potential BBP exposure:

- Researchers conducting experiments with human blood, human tissues, or human cells
- Researchers or health care workers that conduct medical procedures



work with BBP materials

medical procedures

Jobs with potential BBP exposure

Work-related BBP transmission examples

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Work-related BBP transmission examples

Potential Exposure to BBPs at work

Work related BBP transmission examples:

-  Injuries from contaminated sharp objects that penetrate the skin
-  Exposed openings or abrasions on your skin
-  Splashes into the mucous membranes of your eyes, nose, or mouth

Jobs with potential BBP exposure

Work-related BBP transmission examples

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Human cell culture risks

Intrinsic properties of the cell culture

Adventitious contamination of the cell culture

Recombinant modifications

Human cell culture risks

Human cell cultures are handled at biosafety level 2 and the cells are assumed BBP materials.



Please also click the notes to the left to learn more.

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Intrinsic properties of the cell culture

Intrinsic properties of the cell culture

Adventitious contamination of the cell culture

Recombinant modifications

Intrinsic Risk Examples

- Cells of human origin may harbor human pathogens.
- Primary cell cultures are obtained from fresh tissues and therefore have more potential for pathogen contamination and less opportunity to characterize the cell line. Well-characterized cell lines have lower risks.

Control

- Assess potential cell risk factors such as the tissue origin, cell type, cell passages, cell transformations, cell source handling controls, and cell characterization (e.g., tested for pathogens and/or likely contaminants).²⁰
- When possible, use better characterized cell lines that have a known and well-defined origin, source, and suitability.

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Adventitious contamination of the cell culture



Intrinsic properties of the cell culture

Adventitious contamination of the cell culture

Recombinant modifications

Adventitious Risk Examples

Cell cultures may be unknowingly contaminated with fungi, mycoplasma, bacteria, viruses, prions, or agents from other cells during research manipulations.



Control

Prevent contamination of cultures by using aseptic techniques and other good microbiological practices (GMP) inside a biosafety cabinet.

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Recombinant modifications

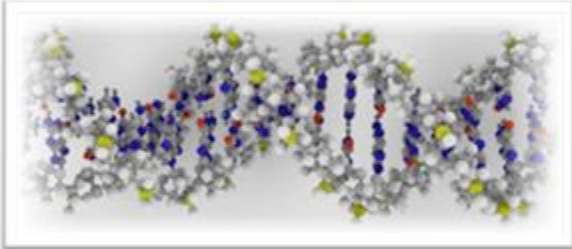
Intrinsic properties of the cell culture

Adventitious contamination of the cell culture

Recombinant modifications

Recombinant Risk Examples

Genetic modifications to the cells may add vectors or change the cell's ability to grow and cause tumors, although the natural immune response of a healthy person will likely destroy recombinant cells.



Control


Evaluate properties and risks associated with the new recombinant cells, recipient cell, vector, donor organism, and gene inserts.

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OSHA BBP Standard

OSHA Bloodborne Pathogens Standard

The purpose of the OSHA Bloodborne Pathogens Standard is to prevent workplace exposure to BBP materials. You can review these resources which will open in a new browser window.




OSHA FactSheet
OSHA's Bloodborne Pathogens Standard

Bloodborne pathogens are infectious microorganisms present in blood that can cause disease in humans. These pathogens include, but are not limited to, hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV). The standard requires employers to ensure that workers are at risk for exposure to bloodborne pathogens.

Provisions Required by OSHA's Bloodborne Pathogens Standard

- All of the requirements of OSHA's Bloodborne Pathogens Standard are in force in the 48 of the states that have adopted the standard. The standard's requirements also apply to employers in the other states who are subject to the standard.
- Employers must implement the use of universal precautions, treating all human blood and OPIM as if known to be infectious for bloodborne pathogens.
- Employers must use engineering controls. These are devices that isolate or remove the bloodborne pathogens from the workplace.
- Employers must provide personal protective equipment (PPE) to workers.



OSHA Bloodborne Pathogens Standard
Entire OSHA BBP standard

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Exposure Control Plan

What is an Exposure Control Plan?

- OSHA requires an Exposure Control Plan (ECP) for work with BBP materials.
- Your Biological Use Authorization is your Exposure Control Plan.
- Your authorization identifies each worker with potential exposure to BBP materials and defines the work, hazards, and controls.

Where can I get a copy of my Exposure Control Plan

- From your work activity leader
- Go online to the [Biosafety Authorization System](#)

Exposure Control Plan

LAWRENCE BERKELEY NATIONAL LABORATORY
Biological Use Authorization
Laboratory-Specific Biosafety Research, and
Exposure Control Plan for Work with Biological Materials

Document Administration

Document Identification & Tracking

General BIC Tracking # & PI Name: B122 Nuclei

Project or Operation Title: Molecular Analysis of Cancer

Document Type and Targeted Removal Frequency
☒ Biological Use Authorization (BIC) ☐ Biological Use Registration (BUR) ☐ Biological Use Notification (BUN)

Document Action				Approval Date	Completed Document #	Removal Target Date
What next approach: Amend, Withdraw, Amend to, Add, Cancelled, Expired (2012)						
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Action Summary or Comments						

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